

## HAKE INVESTIGATIONS

The hakes represent one of the three major species groups of the New England and Middle Atlantic area. The hake group includes the red hake (Urophycis chuss), the white hake (U. tenuis), the silver hake (Merluccius bilinearis), the American Hake (M. albidus), and several others of no immediate importance.

These fishes support food fisheries to a moderate extent and the industrial fisheries to a great extent. They are sufficiently similar from a morphological and ecological viewpoint that they are best studied as a group. At this time, it is particularly vital that this investigation concern itself with an intensive life history program designed to establish those population parameters required to make judgments on proper management procedures.

August 6, 1959

21. The distribution and abundance of the American hake ~
22. The definition of stocks of the American hake /
23. Vertical distribution of the American hake
24. Seasonal distribution of the American hake
25. A study of the eggs and larva of the American hake

Investigation: Hake  
Biological Laboratory: Woods Hole, Mass.

Investigation: Hake  
Biological Laboratory: Woods Hole, Mass.

# SUMMARY C ROL SCHEDULE

Investigation: Hake  
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years									
		57	58	59	60	61	62	63	64	65	66
Red hake											
13. The development of aging techniques	33.5	8.0	10.0	8.0	4.0	3.5	--	--	--	--	--
14. Age and growth of the red hake	24.5	--	--	8.0	4.0	3.5	4.0	5.0	--	--	--
15. Distribution and abundance of the red hake	30.7	--	--	--	--	3.5	4.0	5.0	5.0	6.0	7.2
16. Seasonal movements of the red hake	23.5	--	--	--	--	3.5	4.0	5.0	5.0	6.0	--
17. A review of red hake biology	33.5	7.9	10.6	8.5	3.0	3.5	--	--	--	--	--
American hake											
18. The development of aging techniques	11.1	--	--	--	3.6	3.5	4.0	--	--	--	--
19. Age and growth of the American hake	17.5	--	--	--	--	3.5	4.0	5.0	5.0	--	--
20. The length and weight relationship	17.4	--	--	--	--	2.2	5.0	5.2	5.0	--	--
21. The distribution and abundance of the Amer. hake	24.4	--	--	--	--	3.0	5.2	6.2	5.0	5.0	--
22. The definition of stocks of the American hake	28.6	--	--	--	--	--	5.2	6.2	5.0	5.0	7.2
23. Vertical distribution of the American hake	22.4	--	--	--	--	--	--	6.2	4.0	5.0	7.2
24. Seasonal distribution of the American hake	16.2	--	--	--	--	--	--	--	4.0	5.0	7.2
25. A study of the eggs and larva of the Amer. hake	16.2	--	--	--	--	--	--	--	3.8	5.1	7.3

\*Total needed by Laboratory for Project in thousands of dollars.

*Objectives and procedures usually not properly considered. 7/9/59*

Sheet No. 1

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Location: Woods Hole, Mass.  
Date: August 6 1959  
File No.

Research Project Outline

Title of Project: Age and growth of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: Raymond L. Fritz, acting

Project Leader: Raymond L. Fritz F.R.B. GS-7

Name

Title

Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Age and growth of a particular species is a basic research project and the results are required for other projects. This information is used to determine the age composition of the commercial catch or population, age at maturity and mortality rates.

Objective: To determine the growth rate of the silver hake in the Gulf of Mexico.

Method of Procedure: To collect and analyze otoliths from samples of all sizes of fish at several times a year.

Phase 1:

Phase 2:

Hake 3

Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs:	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Total Needed by Laboratory for Complete Project			<u>29.0</u>
Personal Services	<u>2.0</u>	<u>1.8</u>	<u>---</u>
Other Expenses:			
Within Project	<u>0.6</u>	<u>0.1</u>	<u>---</u>
Lab. Adm. & Ser.	<u>5.4</u>	<u>1.1</u>	<u>---</u>
Lab. Total	<u>8.0</u>	<u>3.0</u>	<u>---</u>
Regional Office	<u>.08</u>	<u>.03</u>	
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 60

Recommended by:		Date
Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph F. Dummer</u>	<u>8/19/59</u>
Branch Chief	<u>NHE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>Fritz</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

#715 7/9/59

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Length Weight relationship of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: Raymond L. Fritz, acting

Project Leader: Raymond L. Fritz F.I.D. GS-9

Name

Title

Grade

Assistants: (Title and Grade)

William H. Callahan Stat. Clerk GS-4

Collaborators:

Need for Information: To be able to evaluate the landings into number and weight of each fish in the catch. This information is also used in the computations for population dynamics and growth.

Objective: To determine the changes in body weight by month and season and the changes that might occur from one year to another.

Method of Procedure: Samples will be collected. The length and weight recorded. The basic analysis of the data will be accomplished by using I. B. M. machines.

Phase 1:

Phase 2:

Hake 4

Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	21.0		
	FY 1959	FY 1960	FY 1961
Personal Services	2.0	1.0	---
Other Expenses:			
Within Project	0.6	0.1	---
Lab. Adm. & Ser.	5.1	1.9	---
Lab. Total	8.0	3.0	---
Regional Office	.08	.03	
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY; Phase 2 FY; Phase 3 FY; Project FY 60

Recommended by:

Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>	<u>Date</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>	
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>	
Regional Director	<u>Joseph H. Dineen</u>	<u>8/19/59</u>	
Branch Chief	<u>WHE</u>	<u>12-24-59</u>	
Approved by:			
Division Chief for Director	<u>[Signature]</u>	<u>1-2-60</u>	

Remarks

(Continue on reverse side)

#715 7/9/59

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Seasonal movements of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz

Project Leader:	<u>R. L. Fritz, Fishery Research Biologist,</u>	<u>GS-9</u>
	<u>Name</u>	<u>Title</u> <u>Grade</u>

Assistants: (Title and Grade)

Collaborators:

Need for Information: The seasonal movements of this species remain unknown at this time. In order to delineate the population stocks, the seasonal movements or migratory patterns must be determined.

Objective: The seasonal distribution should be studied in order to determine the extent and the reasons for the migrations.

Method of Procedure: Tagging and surveys are necessary to complete this project.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	<u>23.5</u>		
	<u>FY 1959</u>	<u>FY 1960</u>	<u>FY 1961</u>
Personal Services	<u>1.0</u>	<u>1.0</u>	<u>1.1</u>
Other Expenses:			
Within Project	<u>0.5</u>	<u>0.1</u>	<u>0.4</u>
Lab. Adm. & Ser.	<u>6.5</u>	<u>1.9</u>	<u>2.0</u>
Lab. Total	<u>8.0</u>	<u>3.0</u>	<u>3.5</u>
Regional Office	<u>.08</u>	<u>.03</u>	<u>.035</u>
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY; Phase 3 FY; Project FY 63

Recommended by:

Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph P. Penner</u>	<u>8/19/59</u>
Branch Chief	<u>WHE</u>	<u>12-24-59</u>
Approved by:	<u>MA</u>	<u>1-2-60</u>
Division Chief for Director		

Remarks

(Continue on reverse side)

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: An evaluation of the fishing effort on the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader:	<u>R. L. Fritz, Fishery Research Biologist,</u>	<u>GS-9</u>
	Name	Title
		Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: A study of the fishing effort will aid the biologist in determining the relative abundance from year to year. A study of this type is necessary to define the variations that occur and to relate these variations to the biological and physical changes.

Objective: To determine the fishing effort in catch per hour or day of the whiting fleet of Gloucester, Mass.

Method of Procedure: An analysis of the number of pounds caught and the time involved by vessel category, by vessels catching 50 percent or more silver hake.

Phase 1:

Phase 2:

## Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	<u>32.5</u>		
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	<u>1.0</u>	<u>1.0</u>	<u>2.0</u>
Other Expenses:			
Within Project	<u>0.4</u>	<u>0.1</u>	<u>0.4</u>
Lab. Adm. & Ser.	<u>6.6</u>	<u>1.9</u>	<u>1.1</u>
Lab. Total	<u>8.0</u>	<u>3.0</u>	<u>3.5</u>
Regional Office	<u>.08</u>	<u>.03</u>	<u>.035</u>
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:		Date
Originator	<u>R. L. Fritz</u>	<u>8/8/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph G. Turner</u>	<u>8/19/59</u>
Branch Chief	<u>WHE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>[Signature]</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Vertical distribution of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: to be assigned

Name

Title

Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To fully understand the movements of this species/not only from one area to another, but)vertically from the bottom to the surface.

Objective: To define the nature and scope of the diurnal migrations of the silver hake.

Method of Procedure: To conduct fishing operations at several offshore stations for a 24-hour period.

Phase 1:

Phase 2:

## Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	<u>20.5</u>		
	<u>FY 1959</u>	<u>FY 1960</u>	<u>FY 1961</u>
Personal Services	<u>---</u>	<u>1.0</u>	<u>2.0</u>
Other Expenses:			
Within Project	<u>---</u>	<u>0.1</u>	<u>0.4</u>
	<u>---</u>	<u>---</u>	<u>---</u>
Lab. Adm. & Ser.	<u>---</u>	<u>1.9</u>	<u>1.1</u>
Lab. Total	<u>---</u>	<u>3.0</u>	<u>3.5</u>
Regional Office	<u>---</u>	<u>.03</u>	<u>.035</u>
Washington Office	<u>---</u>	<u>---</u>	<u>---</u>
Total	<u>---</u>	<u>---</u>	<u>---</u>

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY; Phase 3 FY; Project FY 64

Recommended by:		<u>Date</u>
Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph G. Chamberlain</u>	<u>8/19/59</u>
Branch Chief	<u>2 WE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>Fritz</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: The Development of ageing techniques for the Red Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: R. L. Edwards, Fishery Research Biologist, GS-12

Name

Title

Grade

Assistants: (Title and Grade)

L. M. Lawday, Fishery Aide, GS-5

Collaborators:

Need for Information: The red hake is the principal species caught by the industrial fishery. In order to determine the age composition of the red hake a method for ageing this species must be developed.

Objective: To examine the scales, otoliths and possibly other hard parts to determine the best indicator of age.

Method of Procedure: Collections of scales, otoliths and other parts to be made monthly throughout the year. An examination of these parts and

Phase 1: an analysis of the data will be published.

Phase 2:

## Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	<u>33.5</u>		
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>
Other Expenses:			
Within Project	<u>0.3</u>	<u>0.1</u>	<u>0.1</u>
Lab. Adm. & Ser.	<u>6.7</u>	<u>2.9</u>	<u>2.4</u>
Lab. Total	<u>8.0</u>	<u>4.0</u>	<u>3.5</u>
Regional Office	<u>.080</u>	<u>.04</u>	<u>.035</u>
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY; Phase 2 FY; Phase 3 FY; Project FY 61

Recommended by:

Originator	<u>R. L. Fritz</u>	Date <u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph F. Cunningham</u>	<u>8/19/59</u>
Branch Chief	<u>WHE.</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>[Signature]</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

Sheet No. 1

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Age and growth of the red hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: R. L. Edwards, Fishery Research Biologist, GS-12  
Name Title Grade

Assistants: (Title and Grade)

L. M. Lawday, Fishery Aide, GS-5

Collaborators:

Need for Information: The age and growth of the red hake is of particular interest to the industrial fishery. The results from this study will determine the rate of growth of this species. These results can be used in other fishery problems such as population studies, age at maturity and others.

Objective: The objective of this study is to determine the rate of growth of the red hake in New England waters.

*This is not the objective  
Sept*

Method of Procedure: Collections made at several times a year of all available sizes of fish.

Phase 1:

Phase 2:

## Method of Procedure: (Cont'd)

## Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	24.5		
	FY 1959	FY 1960	FY 1961
Personal Services	0.6	1.0	1.0
Other Expenses:			
Within Project	0.1	0.1	0.4
	---	---	---
Lab. Adm. & Ser.	7.3	2.9	2.1
Lab. Total	8.0	4.0	3.5
Regional Office	.08	.04	.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY; Phase 3 FY; Project FY 63

## Recommended by:

		Date
Originator	<u>R.L.Fritz</u>	<u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph F. Omerchar</u>	<u>8/19/59</u>
Branch Chief	<u>WFE.</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>JLH</u>	<u>1-1-60</u>

Remarks

(Continue on reverse side)

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Distribution and abundance of red hake

Investigation Title: Hake (presently part of Whiting sub-investigation)

Investigation Chief: R. L. Frits

Project Leader:	<u>R. L. Edwards</u>	<u>F.R.B.</u>	<u>GS-12</u>
	Name	Title	Grade

Assistants: (Title and Grade)

<u>R. L. Frits</u>	<u>F.R.B.</u>	<u>GS-9</u>
<u>L. Lawday</u>	<u>F.A.</u>	<u>GS-5</u>
<u>W. Callahan</u>	<u>Stat. Clerk</u>	<u>GS-5</u>

Collaborators:

Need for Information: This species is the backbone of the industrial fishery. It is apparently fished heavily only in limited areas within its total range which is unknown. The present level of exploitation can only be crudely estimated pending more extensive information about the distribution and abundance of the entire population.

Objective: To define the distribution and relative abundance of the red hake, by season, in the Gulf of Maine and in the Middle Atlantic region.

Method of Procedure:

Phase 1: Analysis of previous census cruise data and further research vessel trips, particularly trips that promise to locate the winter-time centers of abundance.

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			30.7
	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
Lab. Adm. & Ser.	---	---	2.3
Lab. Total	---	---	3.5
Regional Office			.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
 (S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY; Phase 3 FY; Project FY

Recommended by:		Date
Originator <u>R. L. Fritz</u>		<u>8/6/59</u>
Investigation Chief <u>R. L. Fritz</u>		<u>8/6/59</u>
Laboratory Director <u>Herbert W. Graham</u>		<u>8/6/59</u>
Regional Director <u>Joseph F. Penner</u>		<u>8/19/59</u>
Branch Chief <u>WHE</u>		<u>12-24-59</u>
Approved by: <u>JLH</u>		<u>1-2-60</u>
Division Chief for Director		

Remarks

(Continue on reverse side)

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Seasonal movements of red hake.

Investigation Title: Hake (presently included in whiting)(industrial sub-investigation

Investigation Chief: R. L. Fritz, Acting

Project Leader:	<u>R. L. Edwards</u>	<u>F. R. B.</u>	<u>GS-12</u>
	Name	Title	Grade

Assistants: (Title and Grade)

<u>L. M. Lawday</u>	<u>F.A.</u>	<u>GS-5</u>
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Collaborators:

Need for Information: The red hake so far has been difficult to tag. There seems to be at least two fairly distinct groups of red hake in the New England area. Somehow, perhaps by defining the seasonal movements, using commercial and research vessel catch data, it will prove possible to demonstrate that stocks do or do not exist in the area.

Objective: To define seasonal movements and to provide data that may be used to help define the presence or absence of stocks based on evidence of differential movements of groups of red hake.

Method of Procedure:

Phase 1: Analysis of commercial and research vessel catch data. Further cruises planned to check hypotheses and to do experimental tagging.

Phase 2:

Hake 16

Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs:	Total Needed by Laboratory for Complete Project		23.5
	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
Lab. Adm. & Ser.	---	---	2.3
Lab. Total	---	---	3.5
Regional Office			.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
 (S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY61; Phase 2 FY; Phase 3 FY; Project FY 63

Recommended by:		Date
Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph F. Pomeroy</u>	<u>8/19/59</u>
Branch Chief	<u>WHE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>H. H. H.</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

#715 7/9/59

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: A review of the red hake biology

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, Acting

Project Leader:	<u>R. L. Edwards</u>	<u>FRB</u>	<u>GS-12</u>
	Name	Title	Grade

Assistants: (Title and Grade)	<u>R. L. Fritz</u>	<u>FRB</u>	<u>GS-9</u>
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Collaborators:

Need for Information: A compilation of the present knowledge of the red hake is needed in order to intelligently plan future research.

Objective: To review all information on the red hake.

Method of Procedure: To write a review of the biology of the red hake, incorporating all aspects of fishery biology.

Phase 1:

*No! The method is to search the literature and abstract it for future use just*

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			<u>33.5</u>
	<u>FY 1959</u>	<u>FY 1960</u>	<u>FY 1961</u>
Personal Services	<u>1.0</u>	<u>1.0</u>	<u>2.0</u>
Other Expenses:			
Within Project	<u>0.2</u>	<u>0.1</u>	<u>0.5</u>
Lab. Adm. & Ser.	<u>7.3</u>	<u>1.9</u>	<u>1.0</u>
Lab. Total	<u>8.5</u>	<u>3.0</u>	<u>3.5</u>
Regional Office	<u>.085</u>	<u>.03</u>	<u>.035</u>
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:

Originator	<u>R.L. Fritz</u>	<u>8/6/59</u>	Date
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>	
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>	
Regional Director	<u>Joseph H. Penner</u>	<u>8/19/59</u>	
Branch Chief	<u>WHE</u>	<u>12-24-59</u>	
Approved by:			
Division Chief for Director	<u>WHE</u>	<u>1-2-60</u>	

Remarks

(Continue on reverse side)

Sheet No. 1

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: The development of Ageing techniques for the American hake.

Investigation Title: Hake Investigation.

Investigation Chief: R. L. Fritz, Acting

Project Leader:	<u>R. L. Fritz</u>	<u>FRB</u>	<u>GS-9</u>
	Name	Title	Grade

Assistants: (Title and Grade)

<u>R. L. Edwards</u>	<u>FRB</u>	<u>GS-12</u>
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Collaborators:

Need for Information: Using bony body parts, to develop an aging technique in order to determine the growth rate and age composition of the American hake.

Objective: To determine the best possible method for aging the American hake.

Method of Procedure: To collect scales, otoliths and other parts and examine each of these for the best method.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs:	Total Needed by Laboratory for Complete Project			111
	FY 1959	FY 1960	FY 1961	
Personal Services	---	2.0	2.0	
Other Expenses:				
Within Project	---	0.2	0.5	
Lab. Adm. & Ser.	---	1.4	1.0	
Lab. Total	---	3.6	3.5	
Regional Office		.036	.035	
Washington Office				
Total				

Recommended Source of Funds S-K and Regular  
 (S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY; Phase 3 FY; Project FY 62

Recommended by:			Date
Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>	
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>	
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>	
Regional Director	<u>Joseph G. Penner</u>	<u>8/19/59</u>	
Branch Chief	<u>2 H.E.</u>	<u>12-24-59</u>	
Approved by:			
Division Chief for Director	<u>11/2/59</u>	<u>1-2-60</u>	

Remarks

(Continue on reverse side)

Sheet No. 1

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Age and Growth of the American Hake (Merluccius olbidus)

Investigation Title: Hake ( project presently in industrial)

Investigation Chief: R. L. Fritz, Acting

Project Leader:	<u>R. L. Fritz</u>	<u>FRB</u>	<u>GS-9</u>
	Name	Title	Grade

Assistants: (Title and Grade)

<u>R. L. Edwards</u>	<u>FRB</u>	<u>GS-12</u>
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Collaborators:

Need for Information: The American hake is as yet unexploited and represents a potential fishery. A research effort directed toward it now will serve two purposes:- (1) it will aid in the interpretation of population studies of exploited fishes, and (2) will do the ground work on the population that should be done on any species prior to exploitation.

Objective: To define the growth rate and its variations, geographically and as a result of environmental change.

Method of Procedure:

Phase 1: Analysis of the studies being conducted on the use of scales and otoliths as tools for aging this species.

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			17.5
	FY 1959	FY 1960	FY 1961
Personal Services	---	---	2.0
Other Expenses:			
Within Project	---	---	0.5
Lab. Adm. & Ser.	---	---	1.0
Lab. Total	---	---	3.5
Regional Office			.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY; Phase 3 FY; Project FY 64

Recommended by:

Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>	<u>8/6/59</u>
Regional Director	<u>Joseph F. Pomeroy</u>	<u>8/19/59</u>
Branch Chief	<u>W. E.</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>J. H. H.</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

Sheet No. 1

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: Length and weight relationship of the American hake.

Investigation Title: Hake Investigation.

Investigation Chief: R. L. Frita, Acting

Project Leader:	<u>R. L. Frita</u>	<u>FRB</u>	<u>GS-9</u>
	Name	Title	Grade

Assistants: (Title and Grade)			
	<u>R. L. Edwards</u>	<u>FRB</u>	<u>GS-12</u>

Collaborators:

Need for Information: **Data needed in the analysis of the species as a resulting potential fishery resource.**

Objective: **To determine the seasonal variations in length-weight relationship of the American hake.**

Method of Procedure: **Collect of length-weight data from material obtained on survey cruises.**

Phase 1: **Statistical analysis of data, (IDP)**

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			<u>17.4</u>
	<u>FY 1959</u>	<u>FY 1960</u>	<u>FY 1961</u>
Personal Services	<u>      </u>	<u>      </u>	<u>1.0</u>
Other Expenses:			
Within Project	<u>      </u>	<u>      </u>	<u>0.2</u>
Lab. Adm. & Ser.	<u>      </u>	<u>      </u>	<u>1.0</u>
Lab. Total	<u>      </u>	<u>      </u>	<u>2.2</u>
Regional Office	<u>      </u>	<u>      </u>	<u>.022</u>
Washington Office	<u>      </u>	<u>      </u>	<u>      </u>
Total	<u>      </u>	<u>      </u>	<u>      </u>

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY61; Phase 2 FY; Phase 3 FY; Project FY64

Recommended by:

Originator	<u>R. L. Fritz</u>	<u>8/6/59</u>	Date
Investigation Chief	<u>R. L. Fritz</u>	<u>8/6/59</u>	
Laboratory Director	<u>Robert W. Graham</u>	<u>8/6/59</u>	
Regional Director	<u>SIGNED: JOSEPH F. PUNCOCHAR</u>	<u>8/19/59</u>	
Branch Chief	<u>HOWARD H. ECKLES</u>	<u>12-24-59</u>	
Approved by:			
Division Chief for Director	<u>[Signature]</u>	<u>1-2-60</u>	

Remarks

(Continue on reverse side)

Sheet No. 1

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Location: Woods Hole, Mass.

Date: August 6, 1959

File No.

Research Project Outline

Title of Project: Distribution and abundance of the American hake.

Investigation Title: Hake Investigation.

Investigation Chief: R. L. Frits, Acting

Project Leader:	<u>R. L. Frits</u>	<u>FHB</u>	<u>GS-9</u>
	Name	Title	Grade

Assistants: (Title and Grade)

<u>R. L. Edwards</u>	<u>FHB</u>	<u>GS-12</u>
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Collaborators:

Need for Information: The information collected in this project will determine the distribution during the year and the availability of this species for commercial exploitation.

Objective: To determine the distribution and abundance of the American hake.

Method of Procedure: Collect and analyze data from survey cruises.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			24.4
	FY 1959	FY 1960	FY 1961
Personal Services			2.0
Other Expenses:			
Within Project			1.0
Lab. Adm. & Ser.			
Lab. Total			3.0
Regional Office			.03
Washington Office			
Total			

Recommended Source of Funds S-K and Regular  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY; Phase 2 FY; Phase 3 FY; Project FY

Recommended by: R. L. Fritz 8/6/59 Date

Originator R. L. Fritz 8/6/59

Investigation Chief R. L. Fritz 8/6/59

Laboratory Director Herbert W. Graham 8/6/59

Regional Director SIGNED: JOSEPH F. PUNCOCHAR 8/19/59

Branch Chief HOWARD H. ECKLES 12-24-59

Approved by: [Signature] 1-2-60

Division Chief for Director [Signature]

Remarks

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